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| | **(50) SITE SERVICES (MAINLY MECHANICAL) - MECHANICAL INSTALLATIONS** | | | | | |
| | **Notes** | | | | | |
| A | The tendering contractors are referred to ARM 4 supplement 2, Agreed Alternative Rules for the Measurement of Services Installations (Issue 1, 2013), used in the production of this section of the pricing document. | | note | | | |
| B | The following works are to be priced in accordance with the detailed design; performance specifications and scheme drawing numbers (list included in the Works Requirements) as prepared by Semple McKillop Consulting Engineers. | | note | | | |
| C | Builders work in connection with the contract works such as cutting or drilling of holes, forming apertures, chases in walls, floors and ceilings will be carried out by the Works Specialist under the terms of the main contract. The Mechanical Specialist shall be responsible for the correct marking out of all attendances, and all other cutting to be performed by the Works Specialist. | | note | | | |
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| | **(50) SITE SERVICES (MAINLY MECHANICAL) - MECHANICAL INSTALLATIONS (Cont)** | | | | | |
| | **ALTERNATIVE RULES FOR THE MEASUREMENT OF MECHANICAL INSTALLATIONS** | | | | | |
| | **(50) SITE SERVICES (MAINLY MECHANICAL) - HEAT PUMPS** | | | | | |
| | System | | | | | |
| | External Air source Heat Pump installation, testing and commissioning; complete with all associated plant, pipework, valves, controls, insulation, frost protection, fully integrated with the building heating system; The heating system shall be flushed and provided with appropriate chemical treatment; The contractor shall provide, prior to handover, a commissioning certificate to confirm that correct treatment has been carried out; all in strict accordance with the Mechanical Engineers Specification Volume 1; Volume 2; Volume 3; Volume 4 and Drawings M-5601 | | | | | |
| | Primary Equipment | | | | | |
| A | Air Source Heat Pump; supply, install, test and commission complete; Model: High Temperature Air Source Heat Pump; Heating Capacity: 63.7kW; Size: 2660mm length x 1130mm width x 2136mm height; SCOP @ nominal output: 3.67; Design temperature: 55°C flow temperature @ A7/W55; Compressor Type: Semi-Hermetic; Source Heat Exchanger: Cu/Al pipes and fins with hydrophilic coating 'Blue Fins'; User Heat Exchanger: Braze Welded Plate, Heat Exchanger (AISI 316 Stainless Steel) c/w closed cell insulation and discharge temp sensor for anti-freeze protection; Refrigerant Type: R290; Outdoor Air Temp (°C): -3.0; Outdoor Relative Humidity (%): 80; Fluid Type: Water; In/Out Fluid Temp (°C): 50.0 / 55.0; Super Low Noise: Required; Max Fan RPM: 900 (low noise); Construction: Galvanised Sheet Steel painted with polyurenate powder enamel c/w removable panels; Control & rotection Devices: Required; Control Panel: Microprocessor based c/w display showing all operational icons and connections for MODBUS protocols; Serial Interface Card RS485: Required to allow the controller to communicate using Modbus Protocol; Head Pressure Control: This device, using a pressure probe installed on the source heat exchanger, controls the fan speed with respect to the ambient conditions; Accessories: Rubber Antivibration feet/pad, Condensate Drip Tray, Anti Freeze Kit, Pressure Gauges, Master / Slave Cascade Control system, Outdoor Air Temperature Sensor for Weather Compensation, Hydraulic Kit comprising centrifugal circulating pump c/w safety valve & fill/drain point; Defrost: Method Reverse Cycle; Defrost Control: Sensor for outdoor temperature; Warranty: 5 year parts and labour; include for all accessories; all in strict accordance with the Mechanical Engineers Equipment Schedule no. 1.1 | | | | | |
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| **(50) SITE SERVICES (MAINLY MECHANICAL) - MECHANICAL INSTALLATIONS (Cont)** | | | | | |
| Warranty Requirements: The Tenderer shall ensure that all heat pump equipment supplied and installed under this contract is covered by a minimum warranty period of five (5) years post date of substantial completion.The warranty must ensure cover of: Compressor, refrigerant circuit, heat exchangers, controls, and all major components, Labour, parts, diagnostics, and call outs for warranty repairs, No exclusions applied since operating due to typical operating profiles defined in this document; Warranty validity shall be dependent upon: Correct system design and installation, Proper commissioning by competent personnel, Operation within the design parameters described below, Compliance with the maintenance regime set out in this section, Internet connection for continuous diagnostics (applicable to certain manufacturers), Where longer manufacturer warranties or reduced frequency service requirements are available at no additional cost, or at a cost saving, the Tenderer must include these within the tender.<br><br>Service & Maintenance Requirements: The Tenderer shall allow for the minimum maintenance regime for the installed heat pump system in the tender pricing in order to maintain the 5-year warranty; Service Frequency; One service visit preferably every two (2) years, unless the equipment manufacturer explicitly requires a shorter interval (minimum one (1) year); (Tenderers shall only price for annual servicing if supported by documented manufacturer requirements.); It is in the Tenderer's interest to negotiate with heat pump manufacturers for longer service intervals in order to price their bid competitively; "Minimum Service Scope (Biennial Visit): Each service visit must include at minimum: Inspection and performance review of the refrigerant circuit, Verification of electrical connections and controls, Checks on hydraulic conditions (flow rates, pressures, pump performance), Cleaning of filters, strainers, and debris screens, Cleaning of coil and fins, Verification of correct operation, setpoints, and system sequencing, Review of system logs and operational history to confirm stable operation; Maintenance must be carried out by competent personnel and appropriately recorded; Tenderers, must include all maintenance requirements to maintain the heat pump warranty for the 5 year period post substantial completion, in their tender pricing.<br><br>Normal Design & Operating Parameters: For warranty purposes, #normal design conditions# refer to operation within the system#s intended thermal and hydraulic envelope, including:Project Specific OperationFor the installations considered in this project:# Systems are designed for ~55øC flow temperatures to maximise efficiency and minimise equipment stress, with the ability to operate at higher temperatures during peak demand within heat pump limits.# Backup boilers (gas/oil) will support peak loads and extreme conditions# The buildings have predictable, daytime based occupancy profiles and low annual running hours due to being schools# Heat pumps will operate predominantly during controlled and stable load conditionsThese factors result in:# Predictable and stable thermal loads# Reduced mechanical and thermal cycling# Lower probability of component stress or degradation# Improved reliability and long term warranty compliance | | | | | |
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| | **(50) SITE SERVICES (MAINLY MECHANICAL) - MECHANICAL INSTALLATIONS (Cont)** | | | | | |
| | Tender Note # Commercial & Technical Expectations:Tenderers must base their submission on the following assumptions:# The systems are conservatively designed and operate comfortably within their capabilities# There is no reliance on electric backup# Operating conditions are stable due to predictable school occupancy profiles# A minimum 5 year warranty must be provided# Only the biennial service visit (once every two years) shall be priced into the tender unless the manufacturer requires otherwise# Tenderers are strongly encouraged to secure extended service intervals from their suppliers to improve lifecycle cost efficiency | | | | | |
| A | Air source heat pump Ref: ASHP-01; Location: External plant compound | 1 | nr | | | |
| | Accessories associated with Primary Equipment | | | | | |
| | Isolation valves; for isolation of LPHW pipework; include for all fittings and accessories; all in accordance with the Mechanical Engineers Specification Part 3, Section 2 | | | | | |
| B | 80mm Stop valves | 3 | nr | | | |
| | Non-return valves; for isolation of LPHW pipework; include for all fittings and accessories; all in accordance with the Mechanical Engineers Specification Part 3, Section 2 | | | | | |
| C | 80mm Non-return valves | 1 | nr | | | |
| | Strainer valve; include for all fittings and accessories; all in accordance with the Mechanical Engineers Specification Part 3, Section 2 | | | | | |
| D | 80mm STR Valves | 1 | nr | | | |
| | Non-close valve; include for all fittings and accessories; all in accordance with the Mechanical Engineers Specification Part 3, Section 2 | | | | | |
| E | 80mm Non-close valve | 1 | nr | | | |
| | Auto-air vent valve; include for all fittings and accessories; all in accordance with the Mechanical Engineers Specification Part 3, Section 2 | | | | | |
| F | 80mm Auto-air vent valve | 2 | nr | | | |
| | Drain cock valve; include for all fittings and accessories; all in accordance with the Mechanical Engineers Specification Part 3, Section 2 | | | | | |
| G | 80mm Drain cock valve | 2 | nr | | | |
| | Test point valves; include for all fittings and accessories; all in accordance with the Mechanical Engineers Specification Part 3, Section 2 | | | | | |
| H | 80mm Test point valves | 4 | nr | | | |
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| | **(50) SITE SERVICES (MAINLY MECHANICAL) - MECHANICAL INSTALLATIONS (Cont)** | | | | | |
| | Commissioning sets; include for all fittings and accessories; all in accordance with the Mechanical Engineers Specification Part 3, Section 2 | | | | | |
| A | 80mm Commissioning set | 1 | nr | | | |
| | Temperature Sensor; linked to BMS; include for all accessories and fittings; complete; all in accordance with the Mechanical Engineers Specification Part 3, Section 2 | | | | | |
| B | 80mm Temperature Sensor | 2 | nr | | | |
| | Pressure Gauge; include for all accessories and fittings; complete; all in accordance with the Mechanical Engineers Specification Part 3, Section 2 | | | | | |
| C | 80mm Pressure Gauge | 4 | nr | | | |
| | Temperature Gauge; include for all accessories and fittings; complete; all in accordance with the Mechanical Engineers Specification Part 3, Section 2 | | | | | |
| D | 80mm Temperature Gauge | 2 | nr | | | |
| | Flexible connections; include for all accessories and fittings; complete; all in accordance with the Mechanical Engineers Specification Part 3, Section 2 | | | | | |
| E | 80mm Flexible connections | 2 | nr | | | |
| | Anti-frost valves; include for all fittings and accessories; all in accordance with the Mechanical Engineers Specification Volume 2 | | | | | |
| F | 80mm Anti-frost valve | 2 | nr | | | |
| | Distribution | | | | | |
| | Pre-insulated, self-compensating, flexible heating pipework and fittings; Miniumum heat loss of 0.216W/m; Insulation: closed cell PUR foam wrapped in corrugated HD PEXa; Operating temp: 95øC; tested to 6 bar; include for all accessories; all in strict accordance with the Mechanical Engineers Specification and Drawings M-5601 | | | | | |
| G | 90/190mm diameter pipework | 1 | item | | | |
| | Medium Grade Black Mild steel pipework and fittings; include for all fixings and supports; include for all elbows, expansion bellows; unions and tees necessary to complete the work, all pipework up to 50mm to be screw joints, pipework above 50mm to be welded, plant room pipework to be flanged; all connections to valves shall be screwed; Painting: two coat of zinc chromate primer prior to fitting of insulation; all in strict accordance with the Mechanical Engineers Specification Part 3, Section 1 | | | | | |
| H | 80mm diameter pipework | 1 | item | | | |
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| | **(50) SITE SERVICES (MAINLY MECHANICAL) - MECHANICAL INSTALLATIONS (Cont)** | | | | | |
| | Insulation | | | | | |
| | Foiled faced fibreglass insulation; to all new pipework services; class A1, CFC and HCFC free with ozone depletion factor of zero; Thermal conductivity not exceeding 0.04W/m2K at 100øC; all joints taped and sealed; all in strict accordance with the Mechanical Engineers Specification Part 1, Section 4.2 | | | | | |
| | Insulation, 40mm thick | | | | | |
| A | to 80mm diameter pipework | 1 | item | | | |
| | Valve jackets provided with Velcro fixings shall be provided on all valves, flanges, pumps and heat exchangers within the plant rooms and externally. All valve jackets used on external pipework shall be weather proof; all joints taped and sealed; all in strict accordance with the Electrical Engineers Specification | | | | | |
| B | General Valve & Plant | 1 | item | | | |
| | Aluminium Cladding; 18mm gauge aluminium, fixed with self-tapping screws; all in strict accordance with the Mechanical Engineers Specification | | | | | |
| C | to 80mm diameter pipework | 1 | item | | | |
| D | General Valve & Plant | 1 | item | | | |
| | General | | | | | |
| | Testing and commissioning; all in accordance with Engineers Specification | | | | | |
| E | Testing and commissioning | 1 | item | | | |
| F | Testing,chemical dosing, sterilization and certification of all systems | 1 | item | | | |
| | Operating and maintenance manuals; all in accordance with Engineers Specification | | | | | |
| G | Operating and maintenance manuals | 1 | item | | | |
| H | Heat pump servicing; One service visit preferably every two (2) years, or in accordance with manufacturers requirements in order to maintain 5 year warranty. | 1 | item | | | |
| | Working drawings; all in accordance with Engineers Specification | | | | | |
| J | Working drawings | 1 | item | | | |
| | Co-ordination drawings; all in accordance with Engineers Specification | | | | | |
| K | Co-ordination drawings | 1 | item | | | |
| | As built drawings; all in accordance with Engineers Specification | | | | | |
| L | As built drawings | 1 | item | | | |
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| | **(50) SITE SERVICES (MAINLY MECHANICAL) - MECHANICAL INSTALLATIONS (Cont)** | | | | | |
| | Identification plates, labels and the like; all in accordance with Engineers Specification | | | | | |
| A | Identification plates, labels and the like | 1 | item | | | |
| | **(50) SITE SERVICES - TRACE HEATING** | | | | | |
| | System | | | | | |
| | Trace Heating installation, testing and commissioning; complete; Trace heating shall be installed on all the water systems where they travel externally between building blocks; Trace heating shall be provided complete with control panels and all required components to prevent system freezing. Capacity of trace heating shall maintain water temperature above 3øC when ambient temperature is -15øC. Trace heating temperature control shall prevent water temperature rising above 10øC. Trace heating system to incorporate air control thermostats and pipework safety cut out thermostats. All trace heating circuits shall be linked to BMS to provide status and fault indication on BMS; Supply electric trace heating complete with fixing tape, shrink sleeves, crimps, junction boxes and controls; all in strict accordance with the Mechanical Engineers Specification and Drawings | | | | | |
| | Primary Equipment | | | | | |
| | Trace heating control panel; all in strict accordance with the Electrical Engineers Specification | | | | | |
| B | Trace heating panel Location: Plant room | 1 | nr | | | |
| | Accessories associated with Primary Equipment | | | | | |
| | Self-regulating heating tape; supply and installation; complete; all in strict accordance with the Electrical Engineers Specification | | | | | |
| C | Self-regulating heating tape | 1 | item | | | |
| | Air control thermostats; supply and installation; complete; all in strict accordance with the Electrical Engineers Specification | | | | | |
| D | Air control thermostats | 1 | item | | | |
| | Safety cut out thermostats; supply and installation; complete; all in strict accordance with the Electrical Engineers Specification | | | | | |
| E | Safety cut out thermostats | 1 | item | | | |

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| | **(50) SITE SERVICES (MAINLY MECHANICAL) - MECHANICAL INSTALLATIONS (Cont)** | | | | | |
| | Insulation | | | | | |
| | Modified polyolefin electrical insulation; all joints taped and sealed; all in strict accordance with the Electrical Engineers Specification | | | | | |
| A | 80mm diameter pipework | 1 | item | | | |
| B | Valves and Plant; generally | 1 | item | | | |
| | General | | | | | |
| | Testing and commissioning; all in accordance with Engineers Specification | | | | | |
| C | Testing and commissioning | 1 | item | | | |
| | Operating and maintenance manuals; all in accordance with Engineers Specification | | | | | |
| D | Operating and maintenance manuals | 1 | item | | | |
| | Working drawings; all in accordance with Engineers Specification | | | | | |
| E | Working drawings | 1 | item | | | |
| | Co-ordination drawings; all in accordance with Engineers Specification | | | | | |
| F | Co-ordination drawings | 1 | item | | | |
| | As built drawings; all in accordance with Engineers Specification | | | | | |
| G | As built drawings | 1 | item | | | |
| | Identification plates, labels and the like; all in accordance with Engineers Specification | | | | | |
| H | Identification plates, labels and the like | 1 | item | | | |
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| **(50) SITE SERVICES (MAINLY MECHANICAL) - MECHANICAL INSTALLATIONS (Cont)** | | | | | |
| **COLLECTION** | | | | | |
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| **(50) SITE SERVICES (MAINLY MECHANICAL) - MECHANICAL INSTALLATIONS Carried to Summary** | | | | | |